

original site. This owl later died due to complications resulting from probable impact with a vehicle.

A SUMMARY OF REPRODUCTIVE SUCCESS AND MORTALITY IN A DISTURBED FERRUGINOUS HAWK (*BUTEO REGALIS*) POPULATION IN NORTHCENTRAL MONTANA, 1990-92

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The Kevin Rim is a sandstone escarpment in northcentral Montana. Ferruginous hawks (*Buteo regalis*) are common nesters along the rim, which is surrounded for several miles by the Kevin-Sunburst oilfield. The Kevin Rim area is considered a Special Management Area under the Bureau of Land Management's (BLM) Key Raptor Area program. Reproductive success and mortality were examined during two studies funded by the BLM. Dr. A.R. Harmata and M. Restani studied the impacts of petroleum development on breeding raptors of the Kevin Rim in 1990. This study was followed in 1991-92 by R.C. Van Horn, who examined the responses of raptors to these disturbances. Nest sites were observed from May to August in 1990, 1991 and 1992. In areas with little human disturbance, the number of fledglings produced per occupied nest varied from 2.20 in 1991 ($N = 6$) to 0.08 ($N = 11$) in 1990. In areas disturbed by petroleum development activities, the number of young per occupied nest varied from 2.60 in 1990 ($N = 12$) to 1.0 in 1992 ($N = 9$). No cases of ferruginous hawk mortality, either as fledgling or adult, could be directly attributed to oilfield activities. Two nests in 1992 had losses apparently due to starvation, but neither was in an area developed for petroleum extraction. Three cliff nests were destroyed during strong thunderstorms in 1992, and multiple nests were raided each year by mammalian and avian predators. Golden eagles (*Aquila chrysaetos*), prairie falcons (*Falco mexicanus*), great horned owls (*Bubo virginianus*), coyotes (*Canis latrans*) and red fox (*Vulpes vulpes*) were all possible sources of mortality.

REPRODUCTIVE SUCCESS OF AMERICAN KESTRELS NESTING ALONG AN INTERSTATE HIGHWAY IN CENTRAL IOWA

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We studied the reproductive success of American Kestrels nesting in nest boxes attached to backs of highway signs along Interstate 35 in central Iowa, 1988-92. Nest box occupancy averaged 45 percent. All of the nest boxes faced either north or south, and there was no significant difference in nest box occupancy by nest box orientation. European Starlings built nests in nearly every nest box not occupied by kestrels. Kestrels evicted starlings from nest boxes, but starlings probably caused some kestrels to abandon their nests as well. Apparent nesting success, the per-

centage of nests fledging at least one young, averaged 69 percent. There was no significant difference in apparent nesting success by nest box orientation. Using the Mayfield method, we detected significantly lower probabilities of survival during the incubation stage in comparison with the brood rearing stage. Clutch size averaged 4.8 over the five years of the study, while mean hatching success was 62.5 percent. Mean brood size was 3.1, and the mean number of birds in a brood to fledge was 2.9. Fledging success, the percent of young hatched that fledged, averaged 91 percent. The reproductive success of kestrels in our study was similar to that of kestrels nesting in nest boxes attached to trees, utility poles, and buildings in other states. The highway sign provides a strong support, a high perch, and predators cannot easily climb to the nest. Across Iowa's agricultural landscape, nest boxes on interstate signs have given kestrels nesting opportunities that would not exist otherwise.

BREEDING DISTRIBUTION, POPULATION TRENDS, AND MANAGEMENT OF FIVE DIURNAL RAPTOR SPECIES IN WASHINGTON STATE

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Statewide nesting surveys of bald eagles (*Haliaeetus leucocephalus*), peregrine falcons (*Falco peregrinus*), osprey (*Pandion haliaetus*), golden eagles (*Aquila chrysaetos*), and ferruginous hawks (*Buteo regalis*) were conducted over the past 8 to 17 years in Washington. Occupied peregrine falcon and bald eagle territories increased from 1 and 114 in 1975, to 17 and 444 in 1991, respectively. Population increases were pronounced on the Olympic Peninsula and Puget Sound. Productivity levels for both species remained near 1.0 yng./occ. terr. in 1991, although depressed productivity for bald eagles continued on the Lower Columbia River and Hood Canal. Osprey territories, distributed statewide except in southeast Washington, increased from 226 in 1984 to 412 in 1989, and productivity was high (1.49 yng./occ. terr.). The golden eagle population, consisting of 187 territories located mainly in northcentral Washington, experienced slight decreases in occupancy (49 percent to 41 percent) and productivity (33 percent to 26 percent) from 1985 to 1990. Preliminary analysis of 103 historic ferruginous hawk territories in eastern Washington indicated decreased occupancy and productivity from 1987 to 1992. Statewide management activities emphasized bald eagles and peregrine falcons; two biologists managed bald eagle habitats on a full-time basis, and the peregrine eyrie-attendant and captive-bred release programs continued from the 1980s.

REPRODUCTIVE PERFORMANCE OF BURROWING OWLS (*ATHENE CUNICULARIA*): EFFECTS OF SUPPLEMENTARY FOOD